A Computer-Based Interview to Identify HIV Risk Behaviors and to Assess Patient Preferences for HIV-Related Health States

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ABSTRACT

We developed a computer-based utility assessment tool to assess the preferences of patients towards HIV -related health states and identify risk behaviors (both sexual and drug related) of the patient being interviewed. The reliability of the computer-based interview was assessed through comparison with person-to-person interviews.

Our pilot study included 22 patients. Twelve of these patients were also interviewed by the research assistants in person-to-person interviews. The agreement between the person-to-person and computer-based interviews was excellent (3 discrepancies of 180 compared answers), and the majority of the patients preferred to use the computer to disclose sensitive information regarding risk behaviors. Our study suggests that assessment of patient preferences and risk factors can be performed reliably through a computer-based interview.

INTRODUCTION

Screening for human immunodeficiency virus (HIV) infection is valuable for two reasons. It allows the HIV infected person to obtain early medical intervention, and it may also provide a public health benefit if screened HIV infected persons alter their risk behaviors. Widespread screening of all patients in all populations is not cost-effective however [1]. Guidelines that customize HIV screening for particular clinical settings may be more cost-effective than generic guidelines that do not take into account differences in patient populations [2].

To investigate the factors that influence the cost-effectiveness of screening for HIV infection, we developed a probabilistic decision model that estimates both the health benefits and costs of a screening program [3]. The screening strategy is represented by a 21-state Markov model; the no-screen strategy is modeled by a 9-state Markov model. The model accounts for changes in length and quality of life caused by HIV infection, transmission of HIV infection to sexual partners, the direct costs of screening, the incremental costs of medical therapy, and the cost savings that accrue when HIV infections are prevented.

The model represents the natural history of HIV disease as progression through three health states: HIV infection without symptoms, HIV infection with symptoms (but without symptoms or complications that meet the case definition of AIDS), and AIDS. We account for the detrimental effect of HIV infection on quality of life by applying quality adjustments to each of these health states. Our analyses with this model indicate that three factors have a critical impact on the cost-effectiveness of a screening program for HIV infection: the prevalence of HIV infection in the screened population, the prevalence of risk behaviors (high risk sexual practices and injection drug use), and the beliefs of the screened persons about the quality of life with HIV infection.

The prevalence of risk behaviors is an important determinant of the cost-effectiveness of screening because it affects the public health benefit that may accrue from testing and counseling. For example, if testing and counseling promotes a decrease in high risk sexual behavior, the potential benefit is greater in a person who has many sexual partners than in a person with one partner. In addition, a screening program that identifies a person with HIV infection may either positively or negatively affect quality of life. These effects of screening on quality-of-life should be considered when evaluating the cost-effectiveness of a screening program.

Although HIV seroprevalence has been studied widely, risk behaviors and patient preferences have not been studied in many populations that are candidates for screening. Since assessment of these population characteristics is essential to determine the cost effectiveness of HIV screening, we developed an instrument to perform such assessments. Our purpose in designing the tool was to collect data for determining the cost effectiveness of screening. The tool also could be used, however, in clinical settings in which clinicians wanted to elicit risk.

We used a utility assessment tool, U-titer, to assess patient preferences for HIV-related health states and to identify HIV risk behaviors. U-titer is an automated, modular utility assessment Hypercard software package [4]. The U-titer software allows the programmer to implement several different methods of assessing patient preferences such as the standard gamble and time trade-off. The programmer is also able to significantly tailor each of these methods. U-titer is a generalized utility assessment tool and has been used in several studies and settings, including assessment of utilities among patients with angina, psoriasis, and atrial fibrillation.

SYSTEM DESCRIPTION

Our version of U-titer adapted for HIV preference and risk assessment consists of a 45 to 60 minute computer-based interview. The interview has three sections. The first obtains demographics: gender, ethnicity, income, average distance traveled, and waiting time for physician visits, level of education, and employment. The second assesses the patient's preferences for the three HIV-related health states: asymptomatic HIV infection, HIV infection with symptoms, ands AIDS.

The interview uses time tradeoff and standard gambles to assess preferences; both are standard approaches for assessment of utilities. We used the utility assessments to calculate the quality adjustments for the HIV-related health states. The HIV-related questions are preceded by a pair of questions on the patient's preferences concerning being blind (monocular and binocular blindness); these questions allow the patient to become familiar with the method of questioning as well as ensure that they understand the utility assessment questions.

The final group of questions identifies patient risk behaviors: type, and frequency of sexual activity (vaginal, oral, and anal intercourse), use of sexual barriers (such as condoms), number of sexual partners, length of sexual relationships, use of drugs (specifically, use of needles), and frequency of needle sharing. The results of the questions are stored in a result file that records both the patient's answers and the time spent answering each question.

Questions are branched so that a patient is only asked those questions that are relevant based on their answers to previous questions. For example, if a patient answers "No" to the question "Other than insulin prescribed for you by a physician, have you ever injected or used needles to take drugs of any kind", the program skips over more specific drug questions to the next series of questions.

The interface was designed so that questions could be answered using a mouse or trackball; patients were not required to type.

METHODS

We recruited patients from the Internal Medicine Clinic and the inpatient services at Stanford University Medical Center. Once patients agreed to participate and gave informed consent, they completed the computer-based interview. The research assistant stayed with the patient for the first few questions to assure that the patient understood both how to operate the computer and, more specifically, that they understood the preference assessment questions. Once the assistant felt comfortable that the patient was capable of completing the interview successfully, the assistant left the patient alone. We believe that in a more private atmosphere patients are more likely to answer the risk behavior questions truthfully.

We used several methods to assess the reliability of the computer-based interview. Internal consistency was assessed by creating several questions that asked for similar information but were worded differently. An example of a pair of questions that were designed to detect possible contradictions is the following (asked of a heterosexual male):

> Question A: "When was the last time you had sex with your partner?"
>
> Question B: "Over the last year, on average, how often did you have vaginal sex with your partner?"

If the patient answered, "Within the last six months" to Question A, yet answered "Never" to Question B (as well as similar questions asking how often the patient and his partner had oral or anal intercourse) then we were able to flag this as an inconsistent patient response.

To assess reliability we interviewed 12 patients in person after they completed the computer-based interview and compared the answers from the computerized interview and the answers obtained in a person-to-person interview. After this personal interview, the patient was asked his or her preferred interview format.

RESULTS

Demographic characteristics of the subjects are shown in Table 1. Ninety-five percent had completed high school. Only 14% of the patients were working either part time or full time. The patients were of varying ethnicities: 41% were White; 36% were Black; 14% were Asian; and 9% were Hispanic.

Table 1 Patient Characteristics

Characteristics	Average or proportion	Range
Age	55.1 years	30 to 82
Education	13.8 years	8 to 20
Gender	0.77 female	-
Income	$24,431	$0 to $90,000

Table 2 Time Tradeoff

	Average	Range	*p* value
HIV+, Asx	0.63	0 to 0.995	0.0013*
HIV+, Sx	0.51	0 to 0.979	0.0636†
AIDS	0.21	0 to 0.896	0.0129‡

HIV+ = HIV infected, Asx = Asymptomatic, Sx = Symptomatic. *p* values calculated with one-sample sign test. Calculations with one-sample t-test were similar.
* HIV+ , Asx compared with AIDS
† HIV+ , Asx compared with HIV+, Sx
‡ HIV+ , Sx compared with AIDS

The quality adjustments (based on the time-tradeoff questions) for the HIV health states are as shown in Table 2. The quality adjustment can vary between 0 and 1.0, with 0 indicating that the health state is equivalent to death, and 1.0 indicating that the health state is equivalent to usual health. The quality adjustments decreased with progressively worse health states, which suggests that the majority of the patients understood the task and the descriptions (Figures 1-3). Differences in the quality adjustments between the health states were statistically significant with the exception of the difference between HIV infection without symptoms and HIV infection with symptoms. This borderline significance is not surprising given our small sample size.

All of the respondents reported having had sex. The average number of lifetime sexual partners was approximately 25 for men and 5.4 for women. During the last year, 11 of 22 (50%) reported having had vaginal intercourse, 6 of 22 (27%) having had oral intercourse, and 1 of 22 (4%) having had anal intercourse. Overall, 27% reported using condoms; the frequency of condom use varied from "occasionally" to "always." Most respondents were in long-term relationships, with 73% reporting relationships that lasted more than three years. Three of 22 patients had used needles to take drugs.

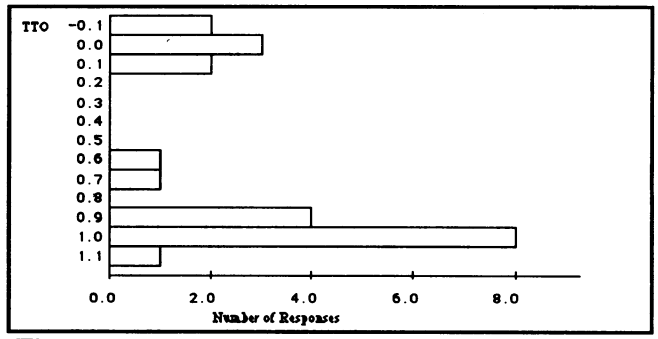

Figure 1 HIV+ Asymptomatic Time Tradeoff Histogram. Utility of -0.1 corresponds to patient who would rather die immediately than live for any length of time with asymptomatic HIV infection. Utility of 1.1 corresponds to a patient who viewed HIV infection without symptoms to be at least equivalent to their current health state.

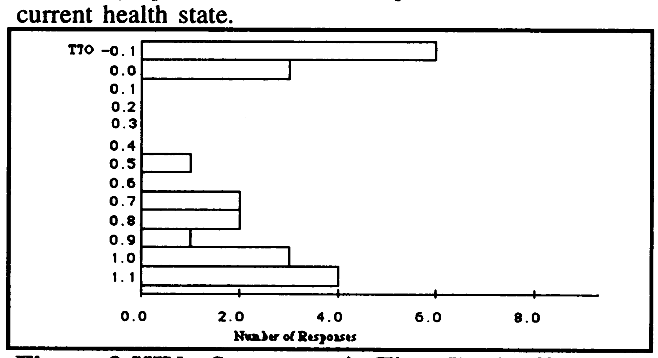

Figure 2 HIV+ Symptomatic Time Tradeoff Histogram. Utility of -0.1 corresponds to a patient who would rather die immediately than live with symptomatic HIV infection. Utility of 1.1 corresponds to a patient who viewed HIV infection with symptoms to be at least equivalent to their current health state.

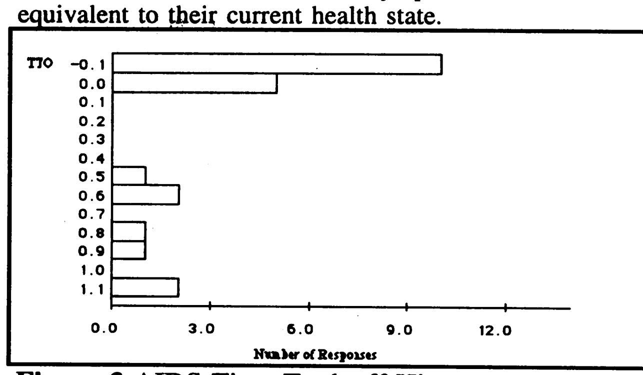

Figure 3 AIDS Time Tradeoff Histogram. Utility of -0.1 corresponds to a patient who would rather die immediately than live with AIDS. Utility of 1.1 corresponds to a patient who viewed AIDS to be at least equivalent to their current health state.

Approximately 24% of outpatients contacted by telephone agreed to participate in the interview. The most commonly cited reason for not participating was lack of time. Seventy-five percent of the inpatients approached agreed to perform the interview. Of the patients who began the interview, 100% completed it.

Table 3 Reported Sexual Behavior

	Average or proportion	Range
Lifetime No. of Partners:		
men	25	16 to >25
women	5.4	1 to >25
Length of partnership	19.44 years	1 night to 58 years
Practicing safe sex	0.27	-
Exclusive partnerships*	0.94	-

* Exclusive partnerships are those where the patient reported having a steady monogamous partner.

The reliability of the assessment tool, assessed by comparing questions asked in person and by computer was excellent. The 12 patients who were interviewed in person answered a total of 180 questions about risk behaviors. In only three of 180 questions (1.7%) did answers differ between the computer-based and the person-to-person interview. In these three questions, respondents declined to answer the question on total number of lifetime sexual partners during the computer-based interview. However, each of these respondents answered the person-to-person questions about current partners. Of the 12 patients who were interviewed in person after the computer-based interview, 9 preferred the computer interview, 2 were indifferent, and 1 preferred the person-to-person interview. Seven other patients who only took the computer-based interview were asked their preference. Of these patients, 4 said they would prefer the computer, and 3 said they would be indifferent.

To illustrate how the data from these interviews will be used, we evaluated the cost-effectiveness of screening in our decision model using data from the interviews as inputs. For example, if we use the low end of the range of quality adjustments for the health state "HIV infection without symptoms" (0, which indicates that the health state is equivalent to death), then screening for HIV infection actually reduces quality-adjusted life years when compared to not screening. That is, the screening strategy not only costs more, but the total health benefit, measured in quality adjusted life years, decreases. If we use the high end of the range for this quality adjustment, however, screening not only increases the number of quality-adjusted life years, but is also reasonably cost effective ($55,700 per quality-adjusted life year saved). The number of current sexual partners a person has also affects the attractiveness of screening. For example, the cost-effectiveness of screening varies from $56,300 to $38,500 per quality-adjusted life year saved as the number of current sexual partners if varied from one to three (the highest number observed in our sample).

DISCUSSION

In this pilot study, we developed and tested a computer-based instrument that assessed patient preferences for HIV-related health states and identified HIV risk behaviors. Our study suggests that a computer-based interview is a viable method for assessing patient preferences and identifying HIV risk behaviors. Although Nease and colleagues [5] showed previously that U-titer is a reliable instrument for utility assessment, our study is the first to use this tool to incorporate the assessment of sensitive risk behaviors into a preference assessment interview. In addition, our instrument is the first computer-based tool developed to assess quality of life with HIV infection.

Elicitation of HIV risk behaviors is important in several contexts. Our short-term objective in eliciting this information was to provide essential inputs for the Markov model used in our analyses of the cost-effectiveness of HIV screening. However, identification of risk behaviors is also important in clinical practice because the initiation of individual clinical or counseling interventions may depend on such knowledge. In addition, identification of risk behaviors is a mainstay of efforts to protect the blood supply — it is used to exclude potential blood donors who may be at increased risk of HIV infection.

The identification of HIV risk behaviors, although important, is also notably difficult. Patients often are unwilling to disclose behaviors which may be stigmatized, or personal, or both [6]. A study of a computer-based interview of blood donors, however, found that the computer-based interview was more effective than the person-to-person interview in identifying risk behaviors [7]. In that study, and in ours, the majority of participants indicated that they preferred a computer-based interview to a person-to-person interview. Thus, we have preliminary evidence that computer-based instruments are preferred to traditional approaches, and may be more effective in identifying risk behaviors.

Our findings indicate that this group of patients understood the description of the health states and the utility assessment task. The decreasing utilities for the health states (asymptomatic HIV infection, symptomatic HIV infection, AIDS) suggest that patients were able to effectively use the computer-based interview to express their preferences for the different HIV-related health states. The subjective impression of the interviewers, however, was that many patients had little familiarity with HIV-related disease. In addition, some patients rated life with HIV-related health states as better than their usual state of health. To facilitate the subjects' understanding of the assessment task, we have since developed more detailed descriptions of the health states. During the patient interviews, we also ask subjects factual questions about the health states to ensure that they have read carefully and understood the descriptions of each state. We have used these strategies previously, and each contributes to the reliability of the utility assessments. The program also assesses whether the subject has misordered the HIV health state utilities — for example if they have stated that they would prefer to live with HIV with symptoms rather than HIV without symptoms. If such a misordering is found then the program alerts the subject and allows them the opportunity to make the relevant time tradeoff decisions again. We also plan to assess test/retest correlation on a sample of 30 subjects.

The use of the utility assessment and risk behavior assessment in determining cost-effectiveness of screening is contingent on the reliability and validity of our computer-based interview. Ideally we would document people's true risk behaviors and compare this with their reported behavior; this task is difficult since we can not directly observe their behavior. Therefore we assessed reliability as compared to the current standard which is the person-to-person interview. The agreement between the computer interview and the person-to-person interviews was excellent as shown by concordance in 98% of the questions.

We plan to further refine the interview based on the results of this pilot study. We will then interview patients at three clinical centers (both inpatient and outpatient) to obtain the desired HIV health state preference assessment and risk behavior information. Data from the interviews will be used to determine the necessity of guidelines for voluntary screening for HIV infection that are customized for particular clinical settings. The cost-effectiveness of these customized screening guidelines will then be estimated and ultimately used to guide screening practices at the participating institutions.

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